NOTE: *This video is only conceptual. The actual implementation of MyoStrain depends on the MRI manufacturer.*

MYOCARDIAL SOLUTIONS
Quantifying Wall Motion

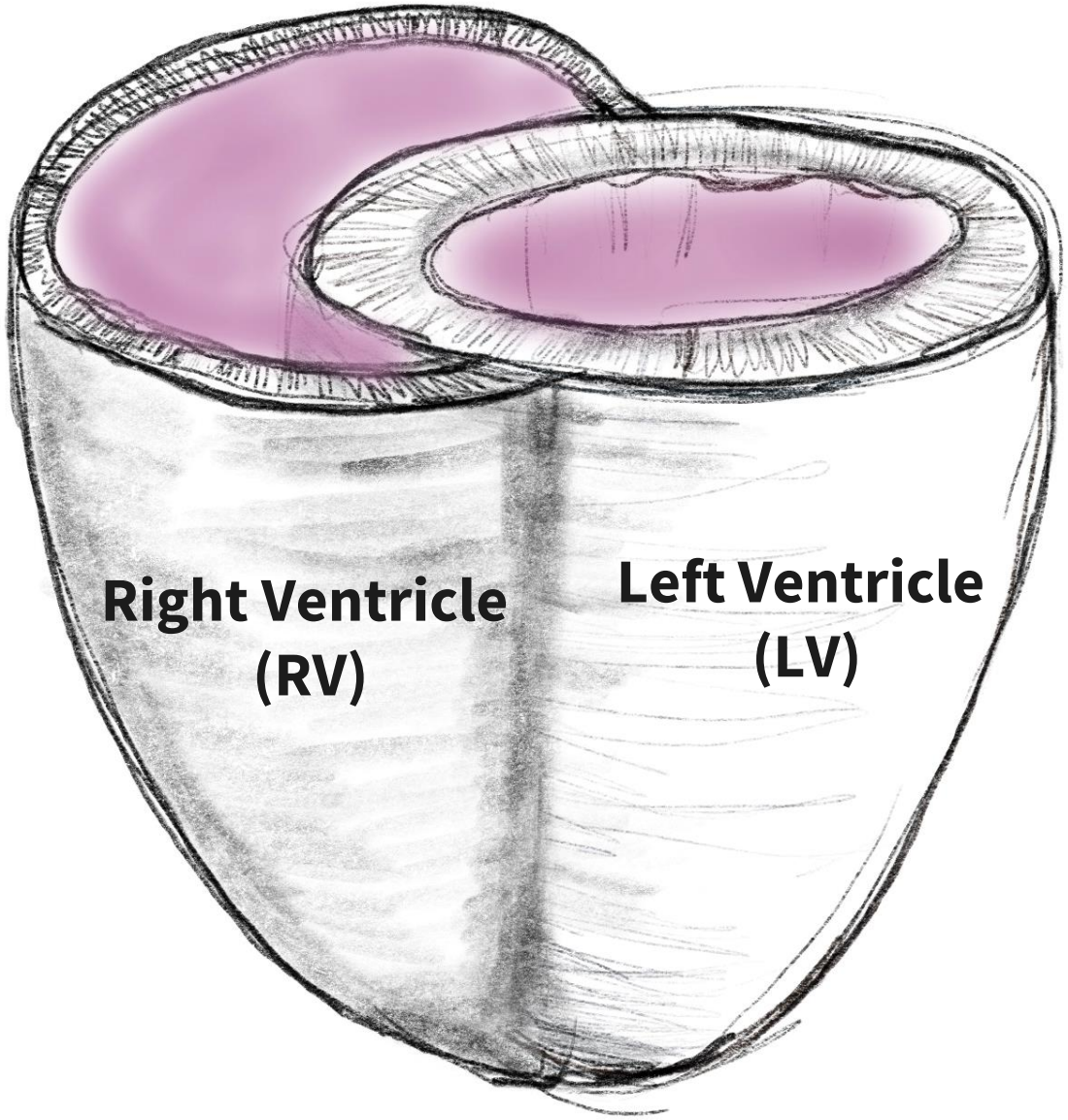
MyoStrain®

Process Video

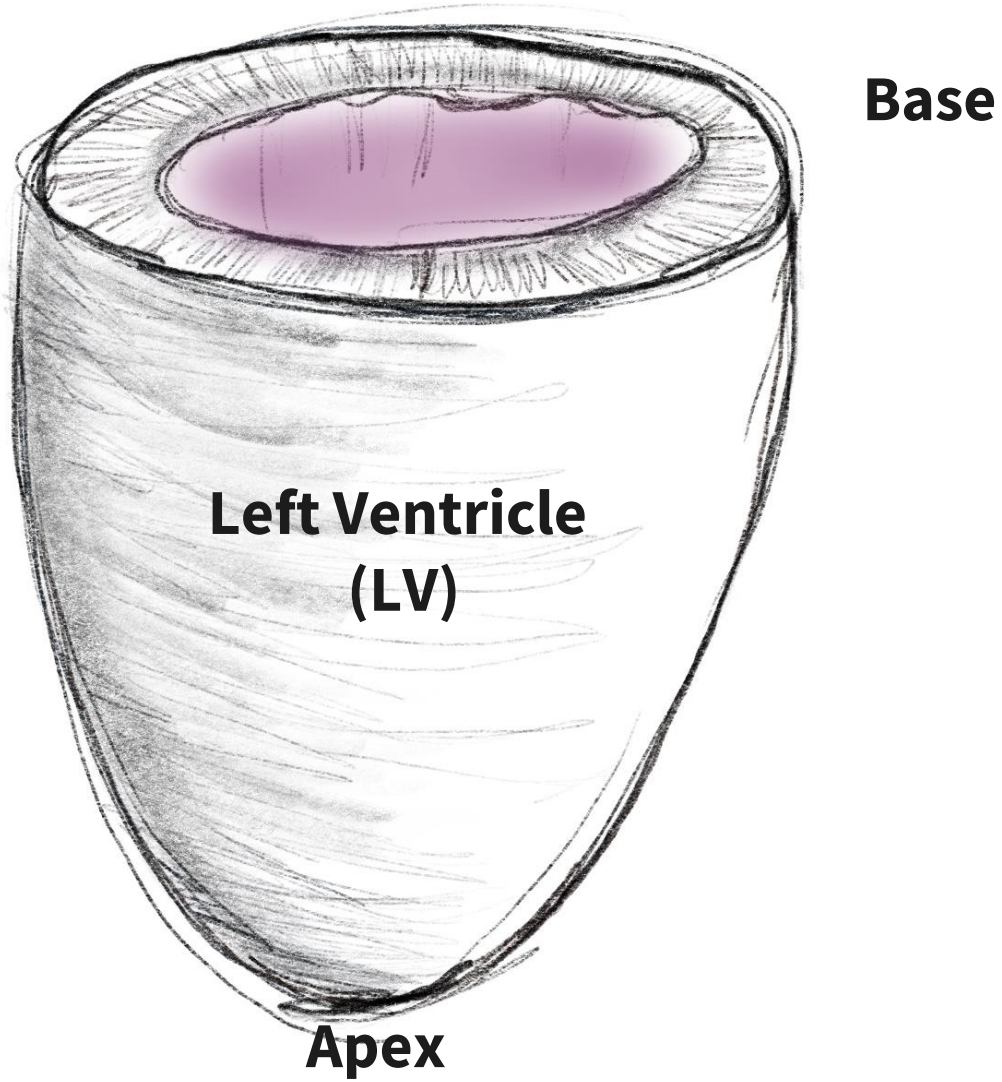
MyoStrain

Quantifying Segmental Contraction

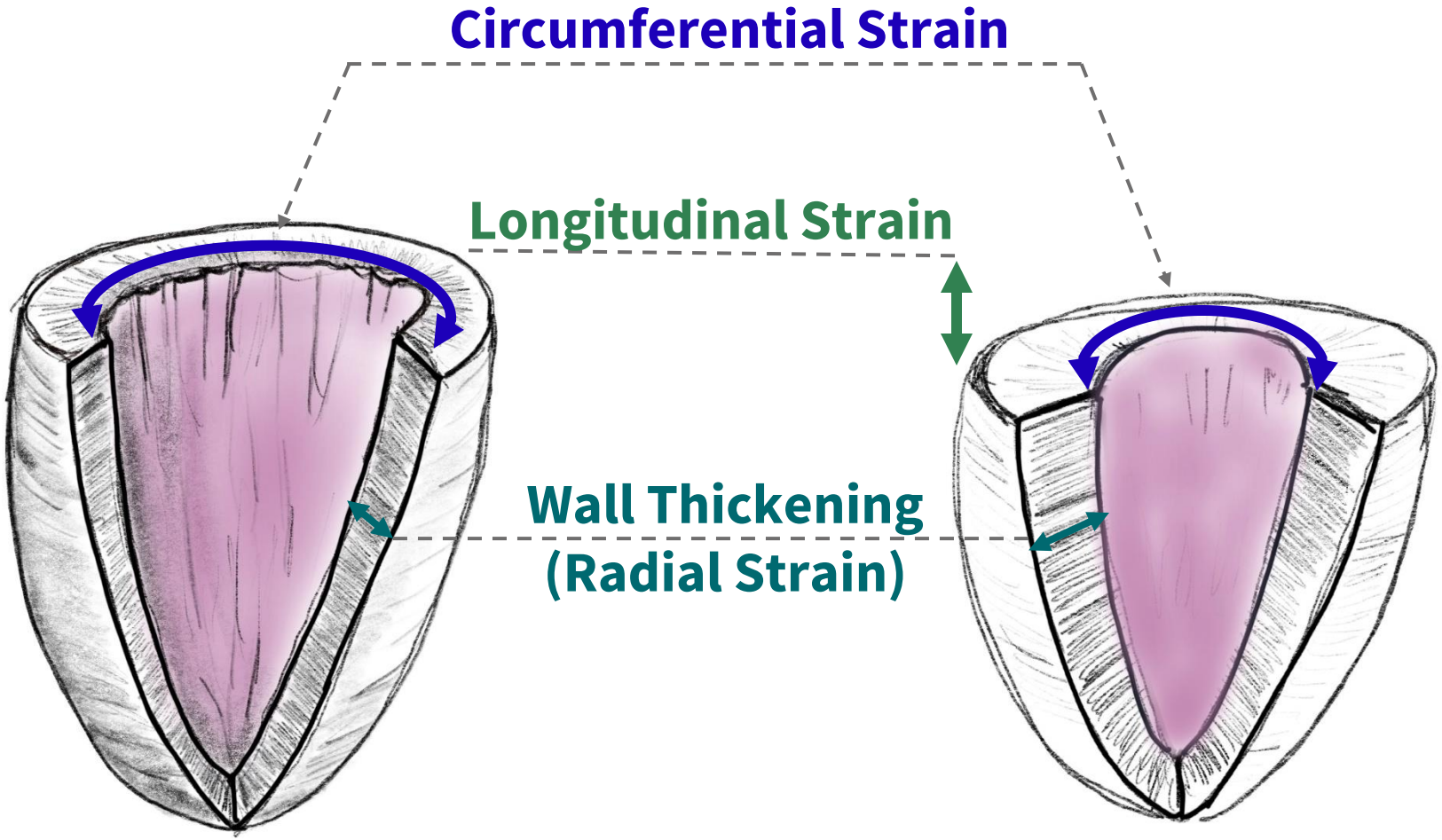
Heart Ventricles



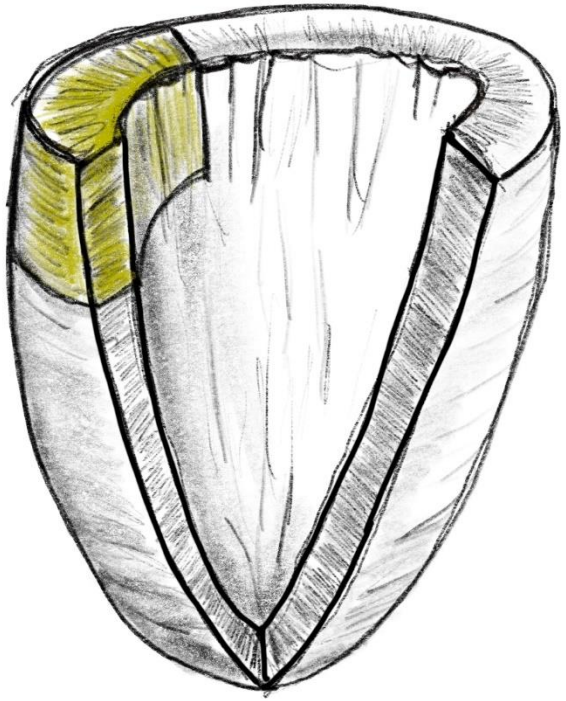
Left Ventricle

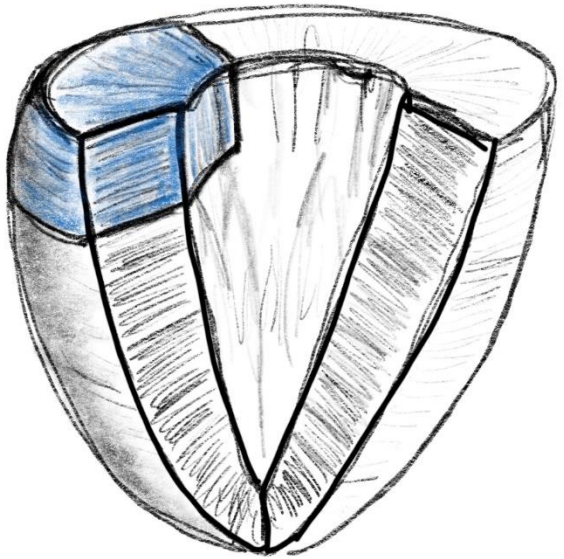


Heart Deformation and Strains During Contraction

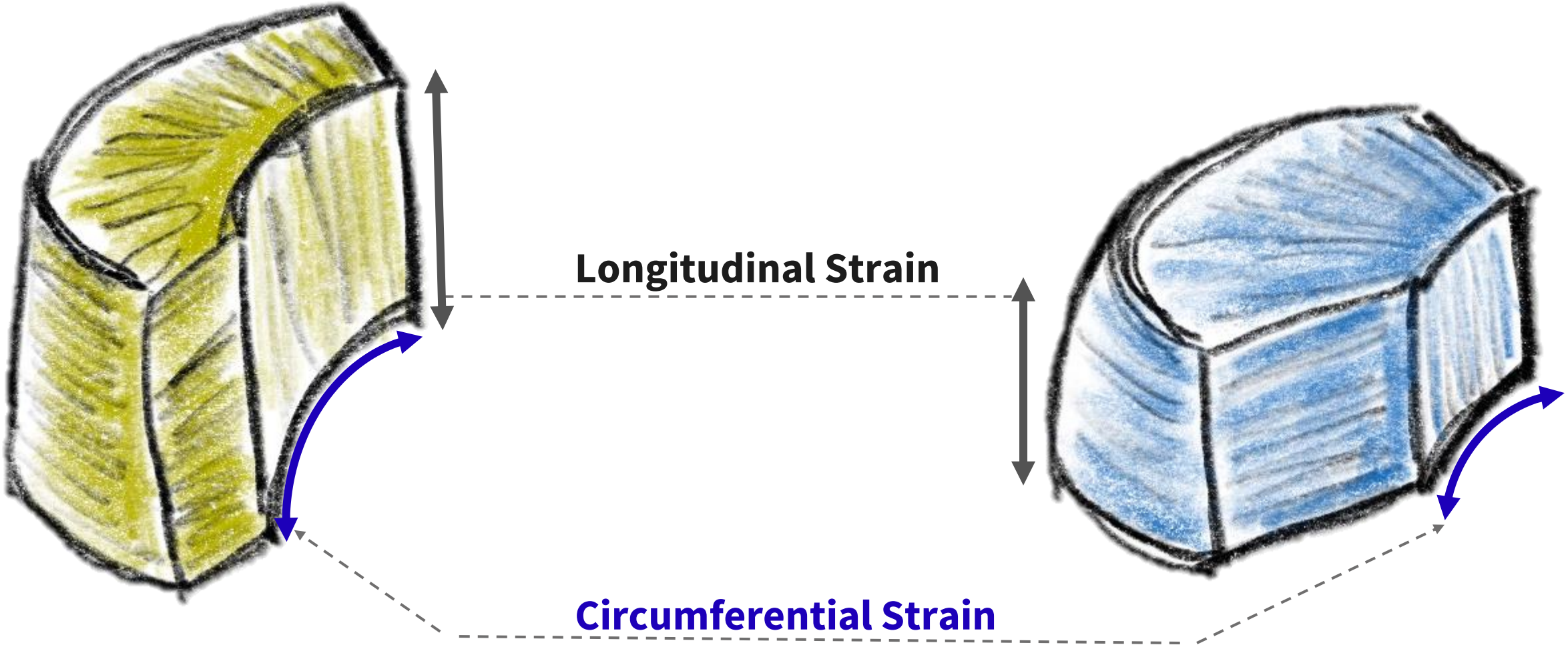


Segmental Strain



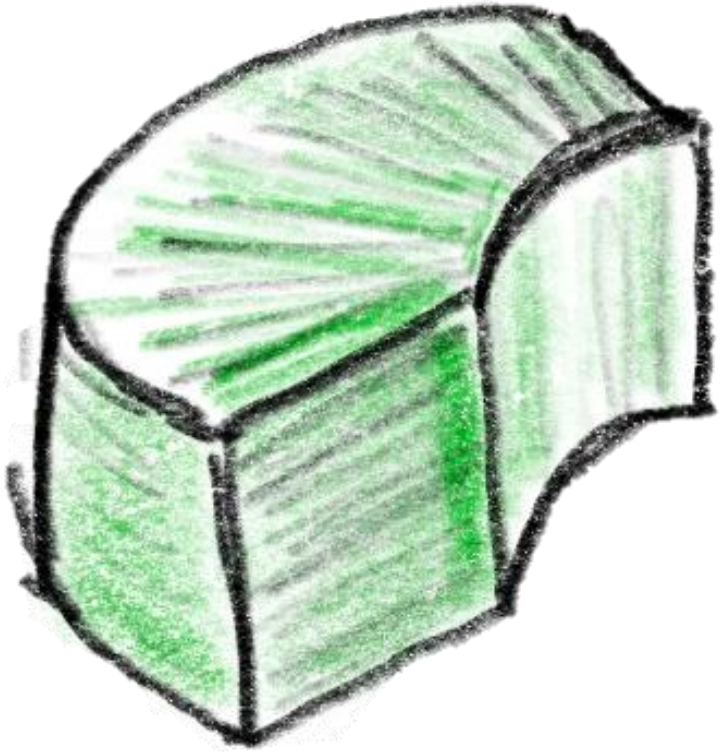


Segmental Strain

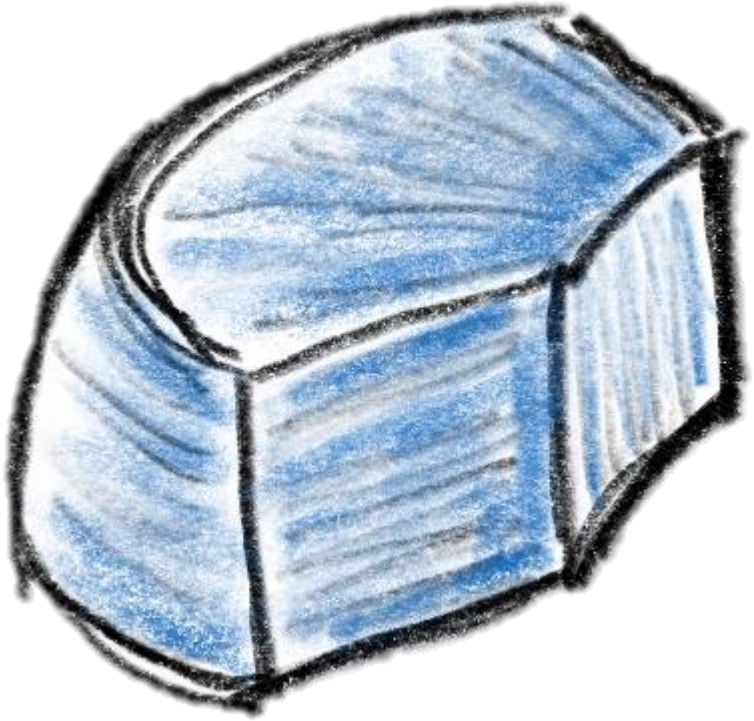


Degree of Contraction

Akinetic (0%)



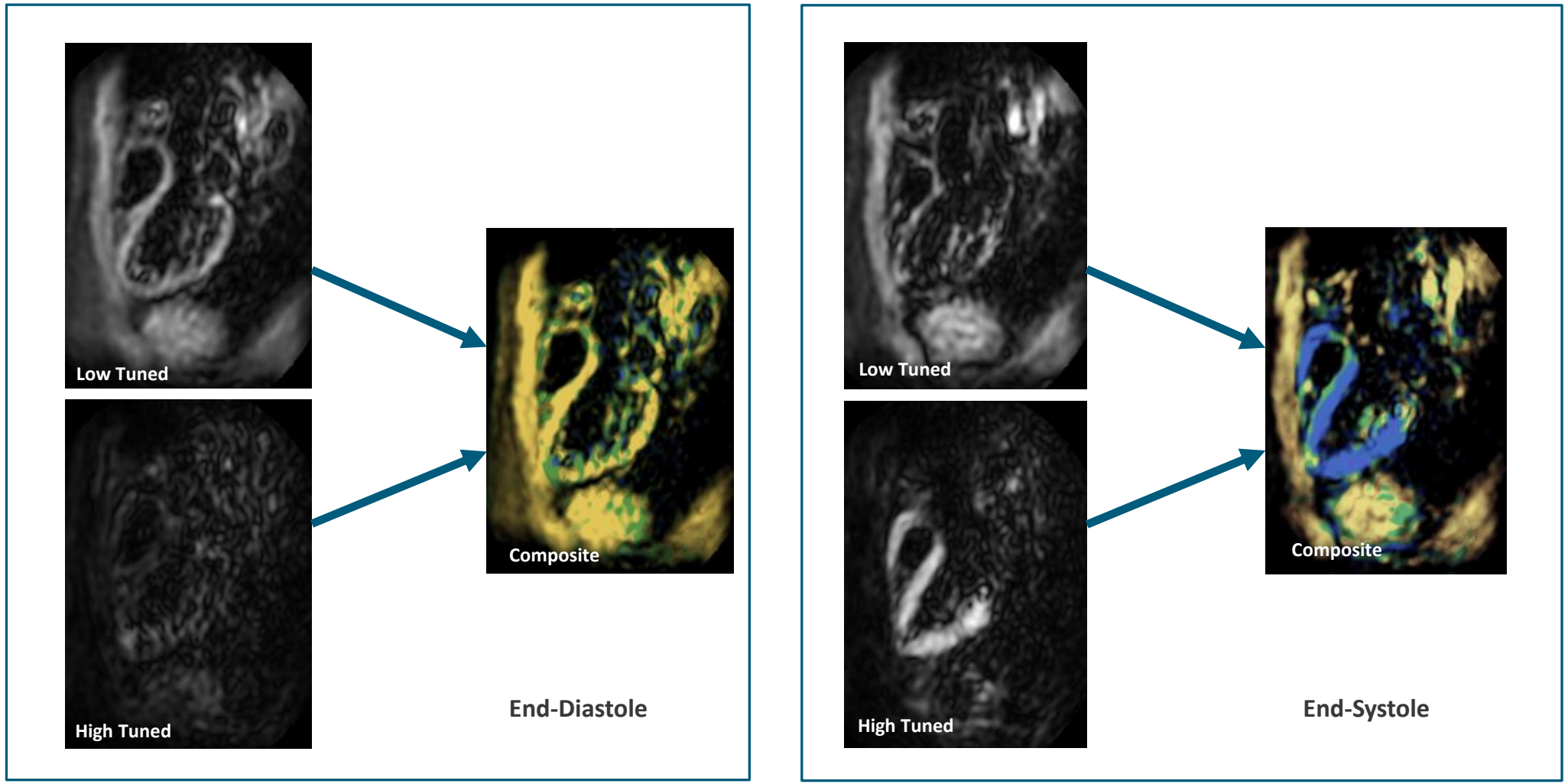
Hypokinetic (-15%)



Normal (-20%)

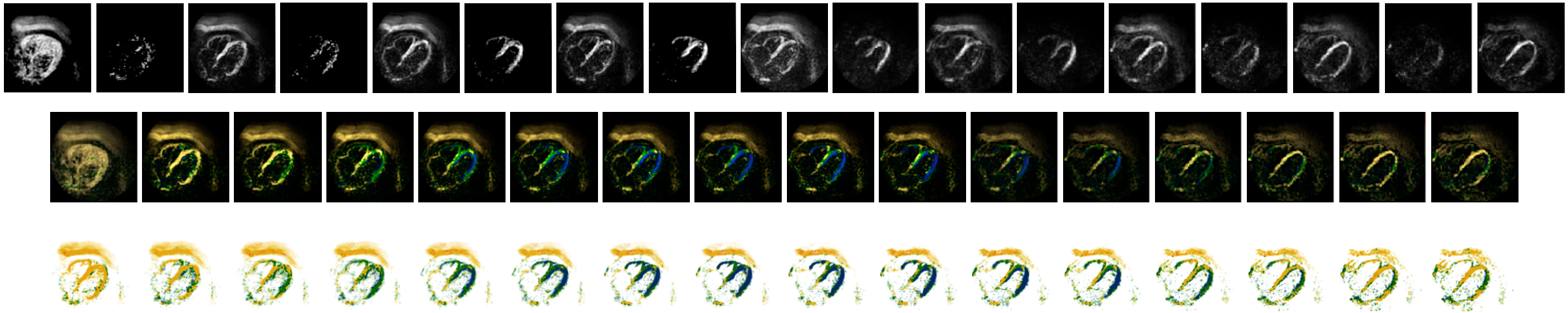
MyoStrain® Uses Proprietary Quantitative Strain Algorithm

Provides Sensitive Measure of LV & RV Intramyocardial Strain

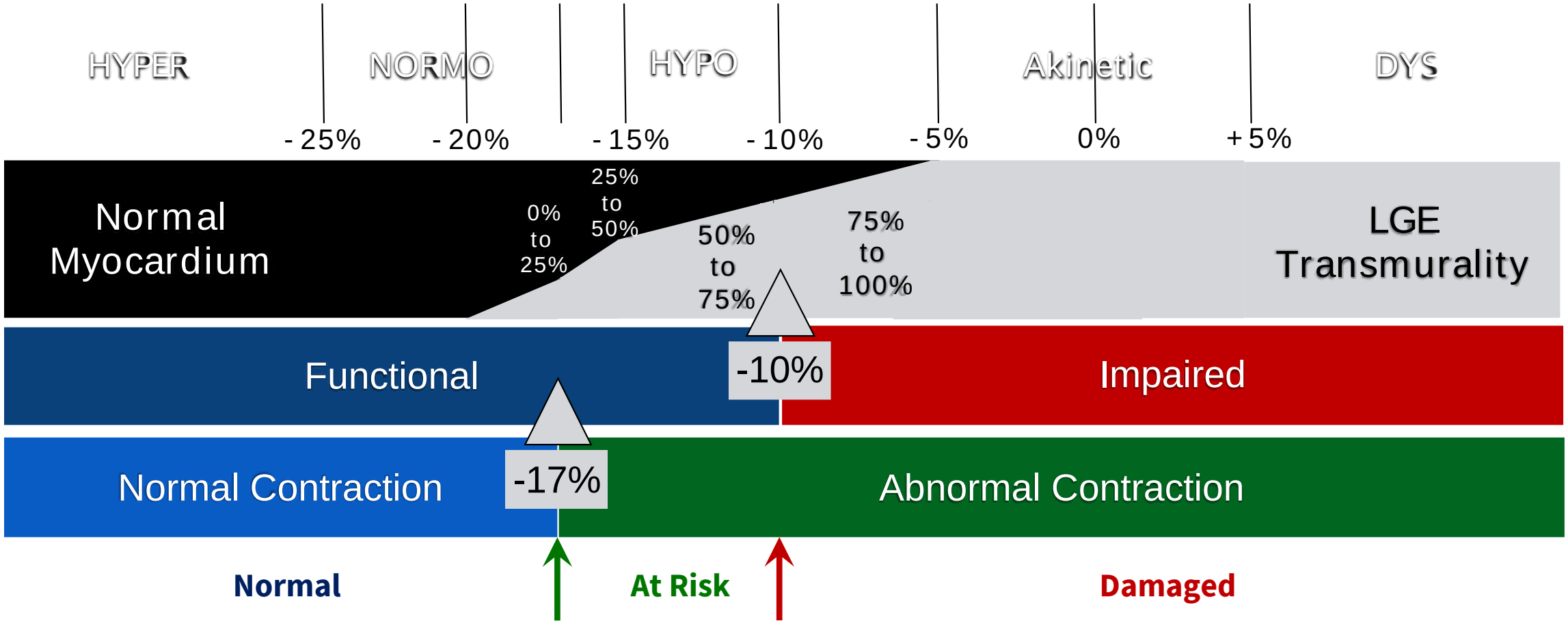


MyoStrain® is a One-Heartbeat Acquisition

- Both low and high tunings are acquires in a single heartbeat



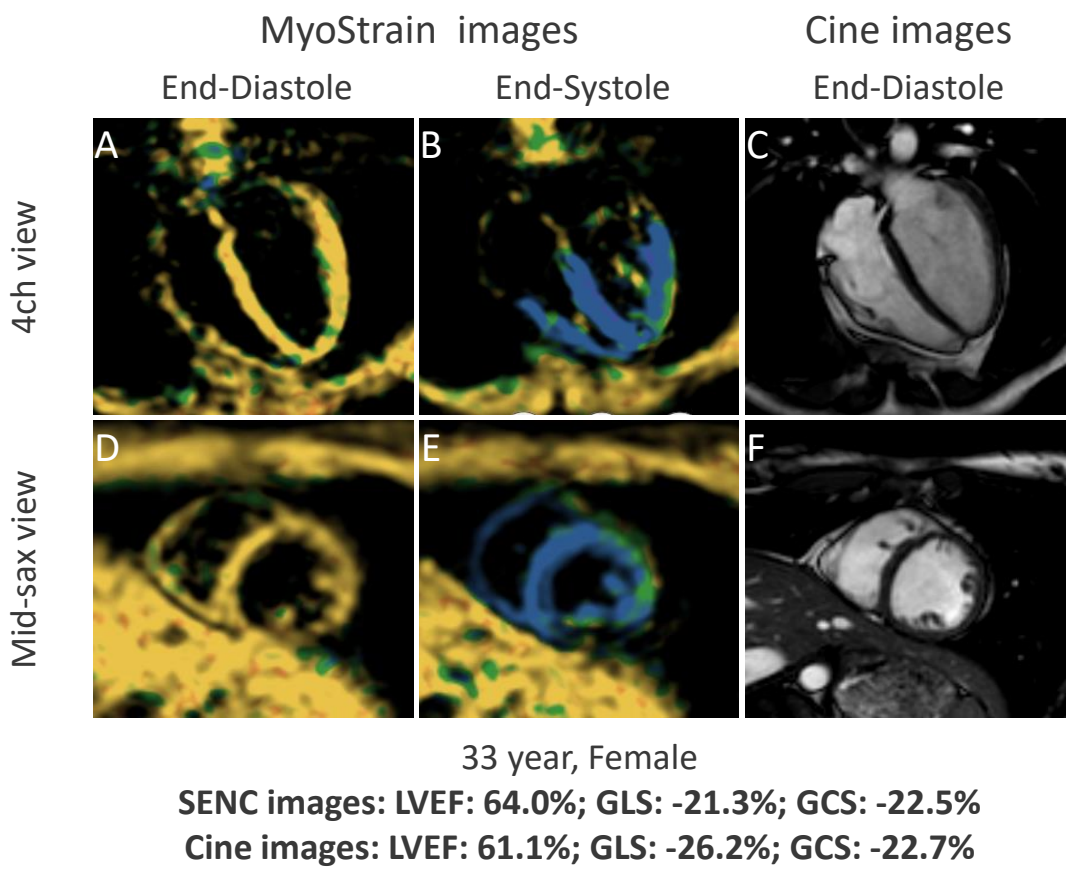
MyoStrain® Quantifies Segmental Function with Validated Scale



- Neizel M, et al. Strain-Encoded MRI for Evaluation of Left Ventricular Function and Transmurality in Acute Myocardial Infarction. Circ Cardiovasc Imaging. 2009;2:116-122.
- Koos R, et al. Layer-specific strain-encoded MRI for the evaluation of left ventricular function and infarct transmurality in patients with chronic coronary artery disease. International Journal of Cardiology. 2013;166:85-89.
- Oyama-Manabe N, et al. Identification and further differentiation of subendocardial and transmural myocardial infarction by fast strain-encoded (SENC) magnetic resonance imaging at 3.0 Tesla. Eur Radiol. 2011;21(11):2362-2368.

Healthy Patient

Minimal Segmental Dysfunction

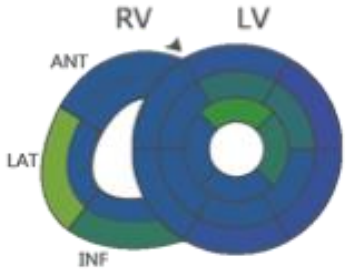


33 year, Female

SENC images: LVEF: 64.0%; GLS: -21.3%; GCS: -22.5%

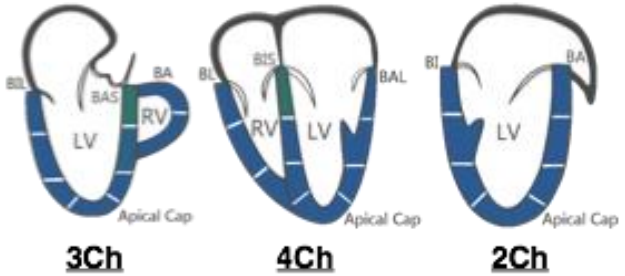
Cine images: LVEF: 61.1%; GLS: -26.2%; GCS: -22.7%

Longitudinal Strain



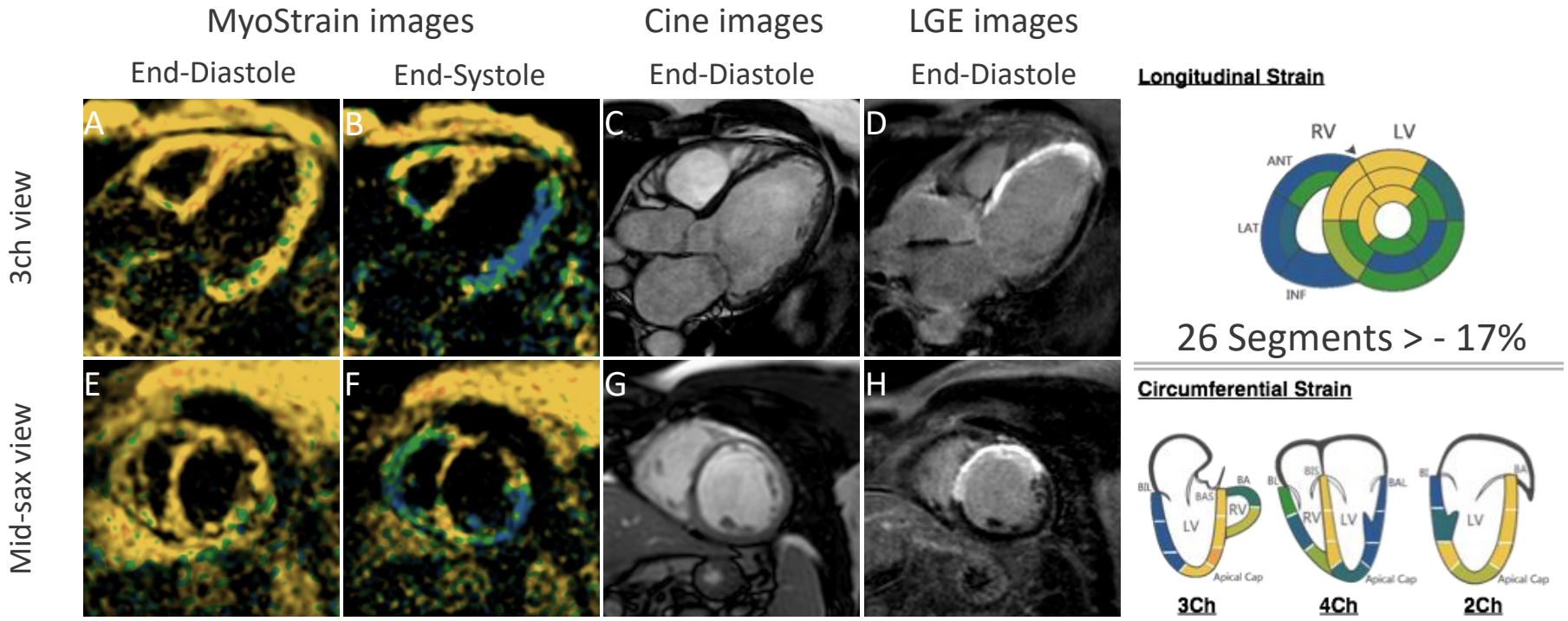
5 Segments > - 17%

Circumferential Strain



Ischemic Heart Disease

Amount and Location of Segmental Dysfunction Correlate to LGE



59 year, Male

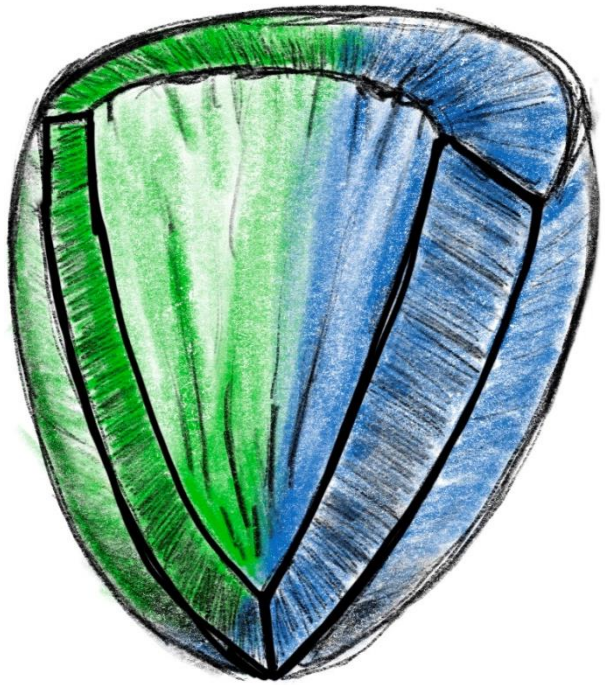
SENC images: LVEF: 29.8%; GLS: -10.5%; GCS: -12.3%

Cine images: LVEF: 33.6%; GLS: -12.8%; GCS: -13.0%

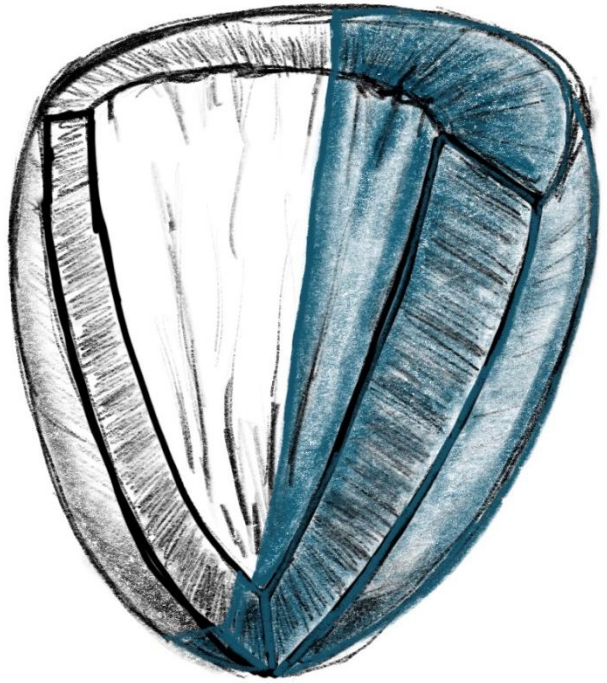
MyoHealth

Measuring the Health of the Heart Muscle

One Number Summarizing All: Global Strain & MyoHealth



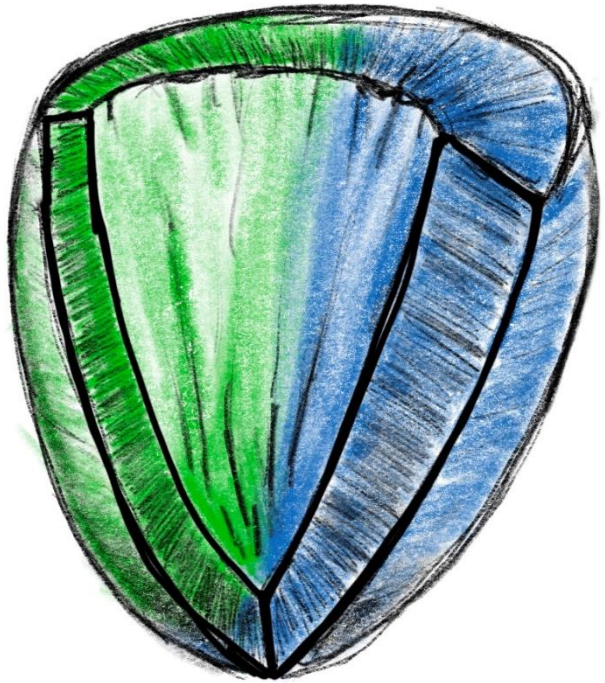
MyoStrain measured in all segments
Global Strain = MyoStrain average over all segments



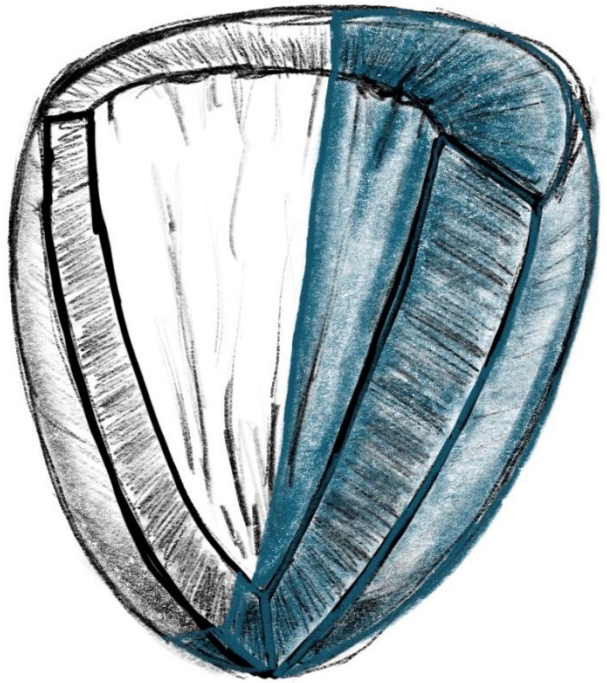
Regions with normal MyoStrain (i.e. MyoStrain <-17%)
MyoHealth = Percentage of regions with normal strain

MyoHealth Versus Global Strain

+ Assume a left ventricle with half the muscle contracting normal (MyoStrain=-20%) and the other half has weak contraction (MyoStrain = -15%)



Global Strain = -17.5%
i.e. healthy heart muscle

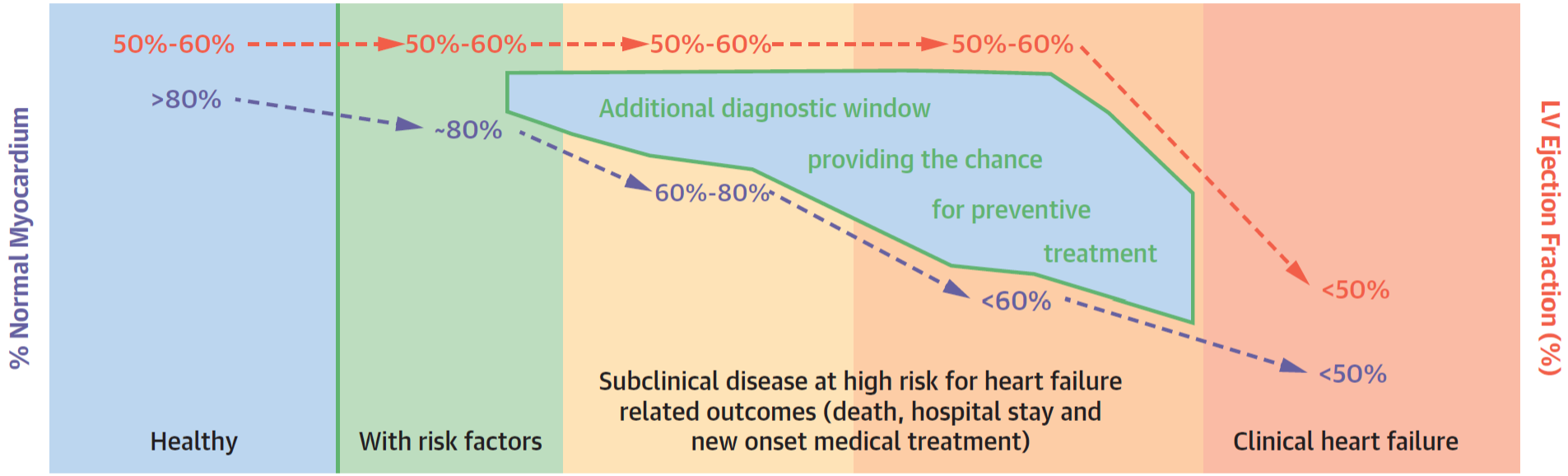


MyoHealth = 50%
i.e. not a healthy heart muscle

MyoHealth can Reveal Changes Missed by Traditional Measurements (Global Strain and EF)

The Diagnostic Value of MyoHealth

CENTRAL ILLUSTRATION **Incremental Value of % Normal Myocardium**



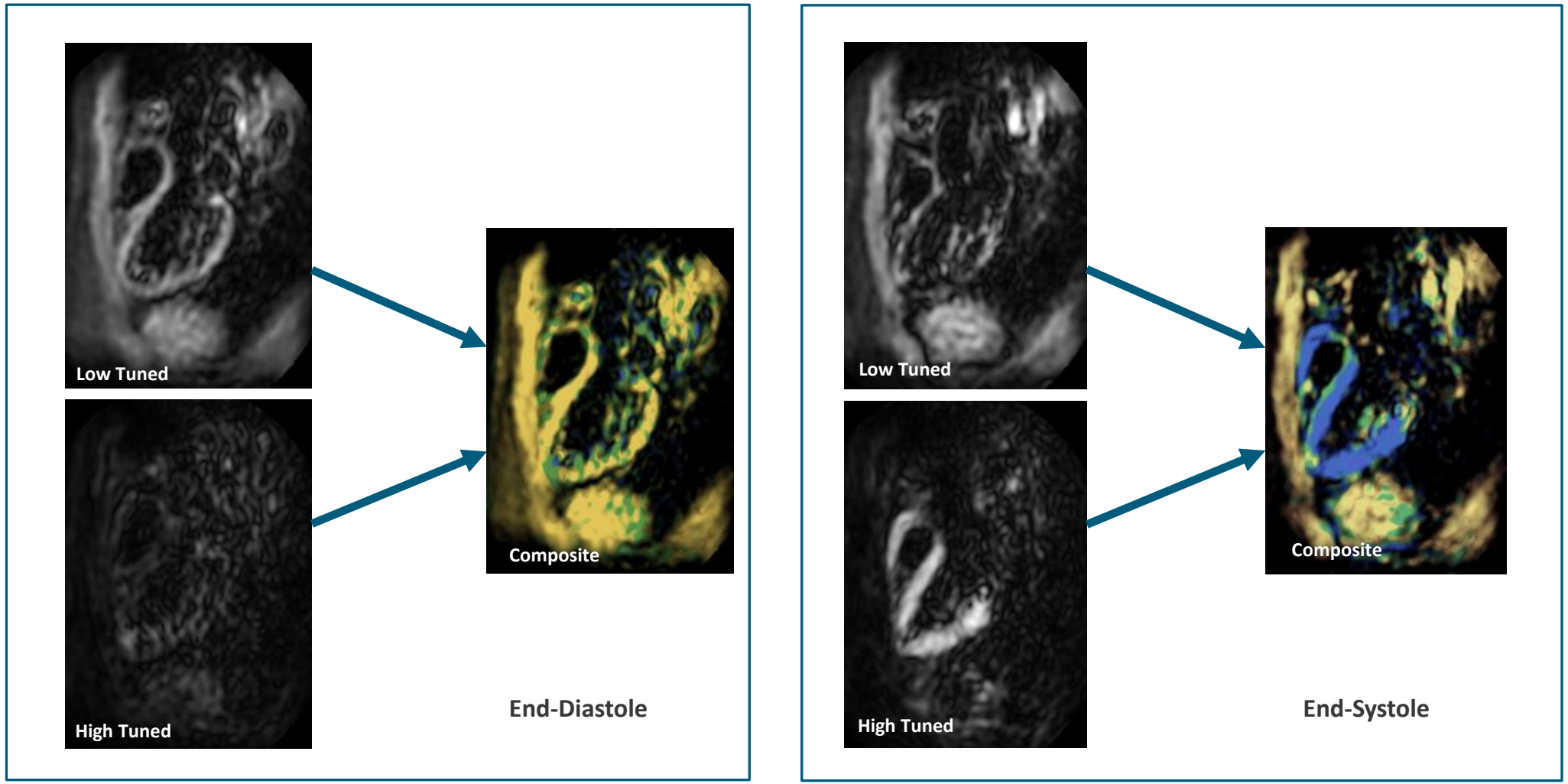
Korosoglou, G. et al. J Am Coll Cardiol Img. 2021;■(■):■-■.

Earlier identification of patients with subclinical left ventricular (LV) dysfunction and at risk for heart failure-related outcomes by fast-strain encoded magnetic resonance compared with LV ejection fraction, providing an additional diagnostic window for prevention treatments.

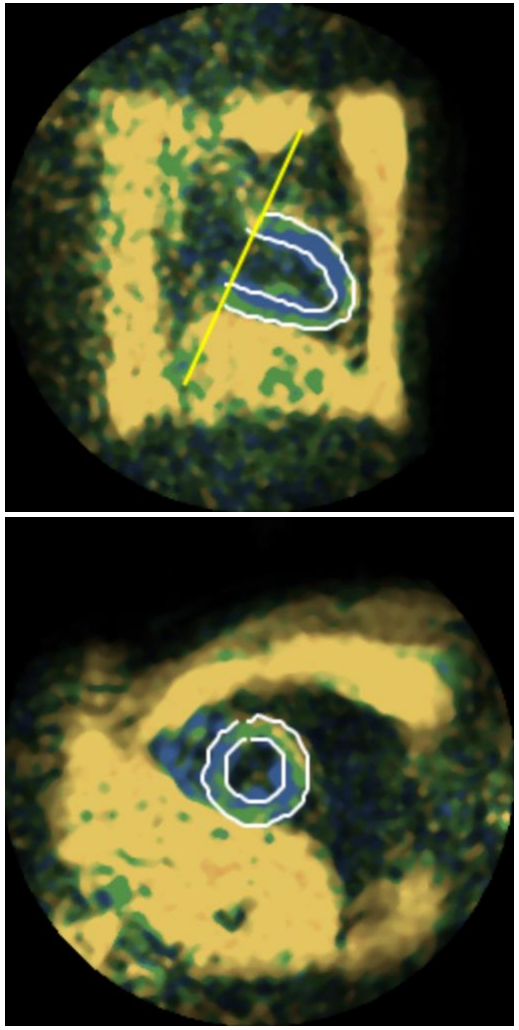
Automating Postprocessing Using AI

MyoStrain® Uses Proprietary Quantitative Strain Algorithm

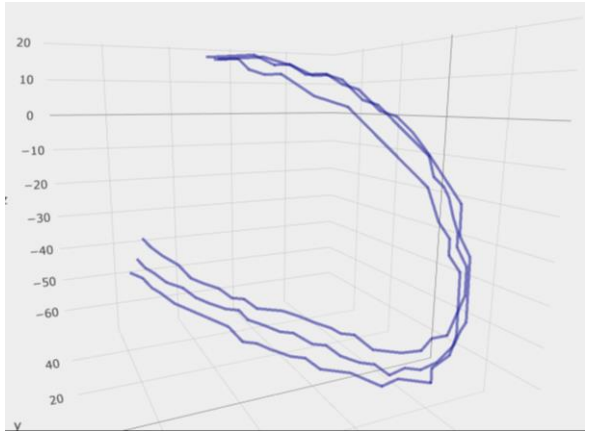
Provides Sensitive Measure of LV & RV Intramyocardial Strain

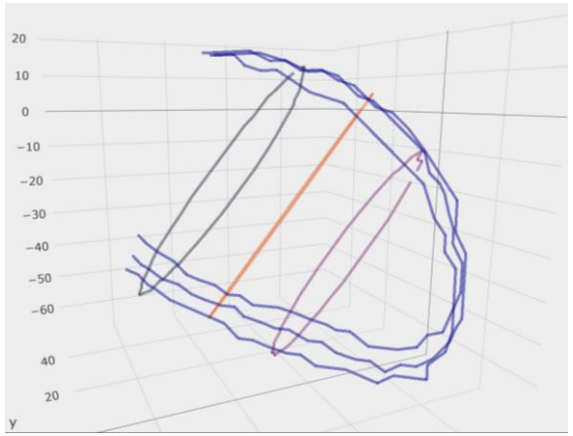


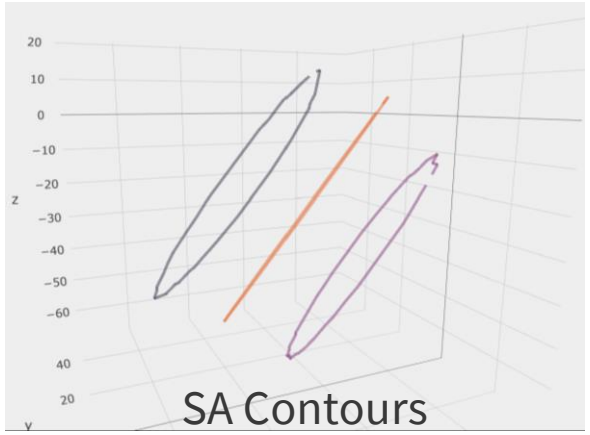
From 2D Movies to 4D Reconstruction



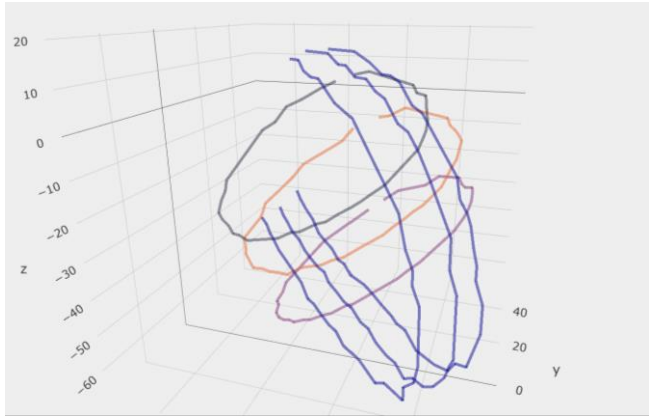
2CH Contours





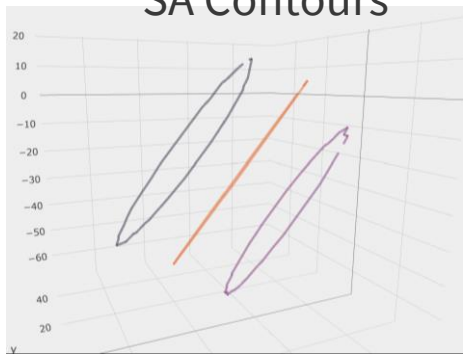


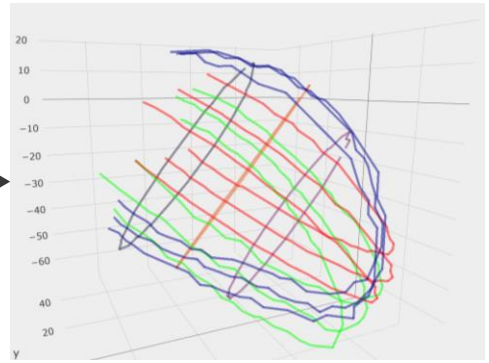
SA Contours

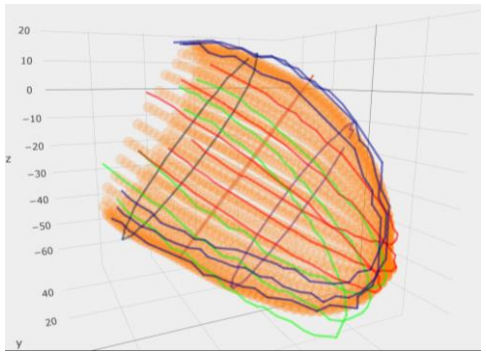


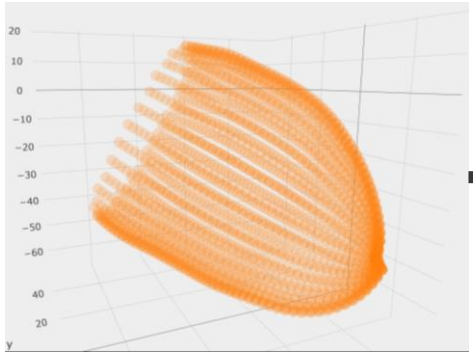
4D Modeling

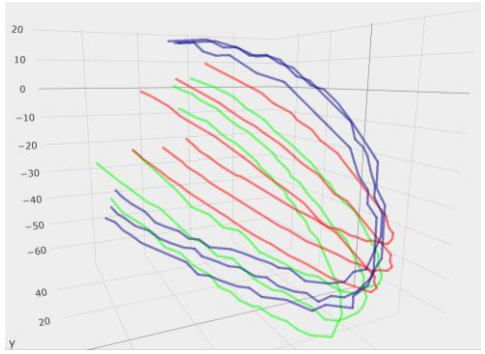
SA Contours



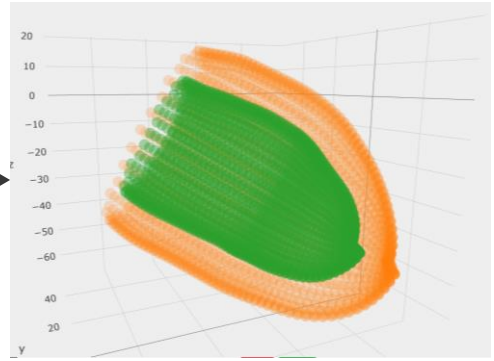


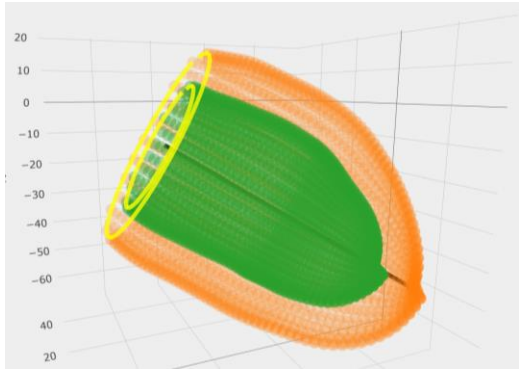




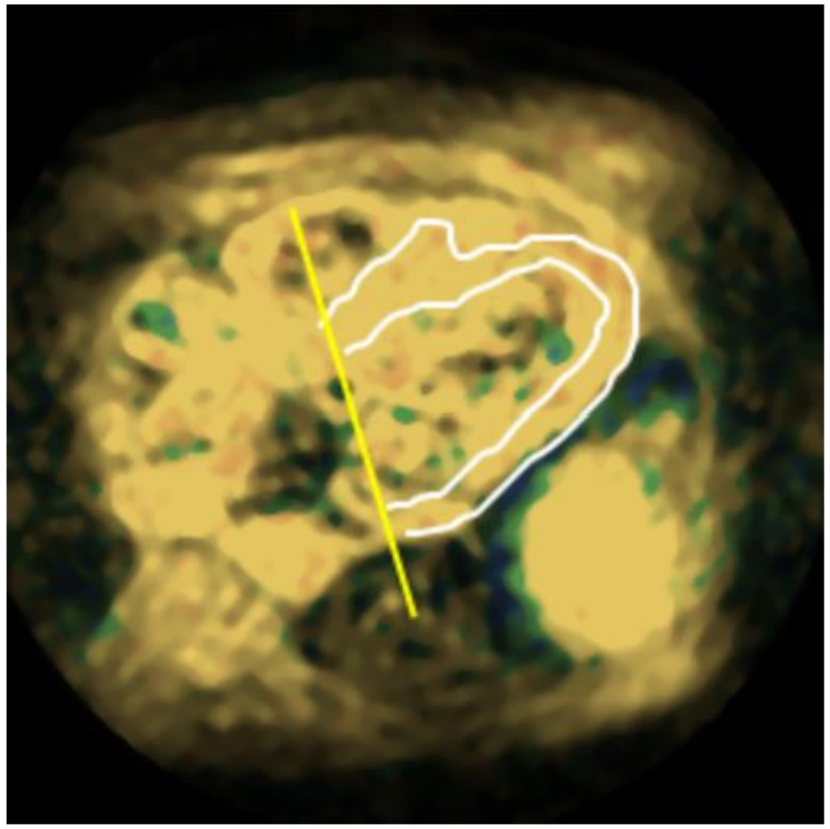


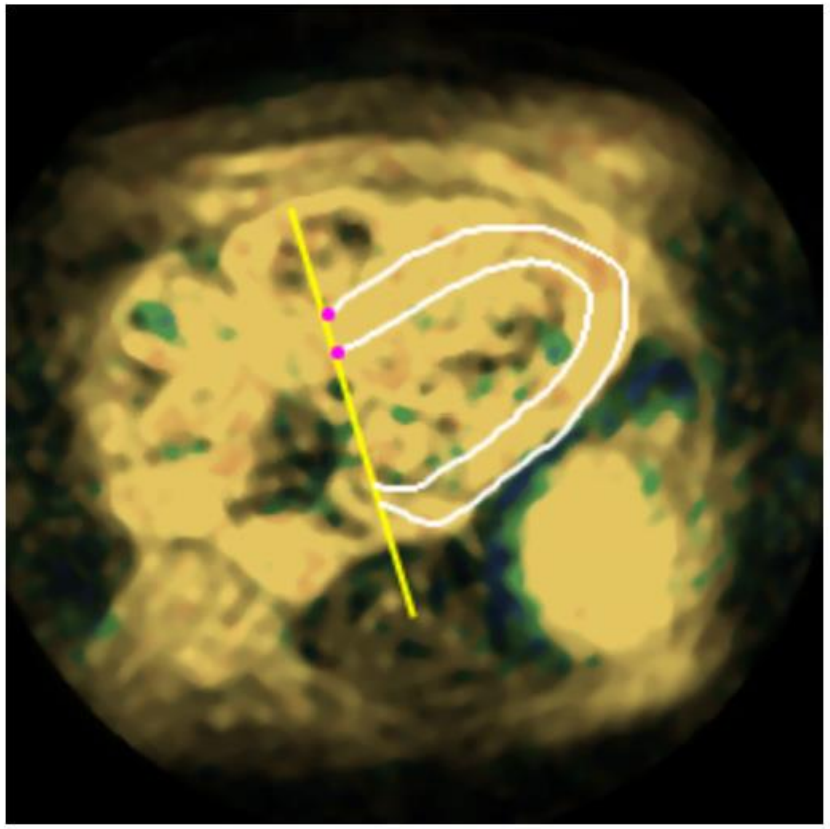
LA Contours





The 4D Model Solves Problems





Comprehensive Report

MyoStrain® Test Results

Myocardial Solutions

Patient: fuqingkai

ID:	cardiac
Gender:	M (male)
DOB:	
Age:	NA
Height:	169.9 cm (5' 6.9")
Weight:	80.0 kg (176.3 lbs)
BSA:	1.91 m2

Accession #:

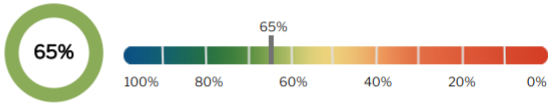
Scan Date:	09/03/2021
Ordering Physician:	
Scanning Technologist:	
Exam Type:	NA
Indication:	
Study Quality:	

LV Dysfunctional Segments [1]

(37/37 Segments Analyzed)

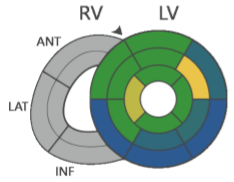
Number of Segments >-10%	2
Number of Segments >-17%	13

MyoHealth™ (% Normal Segments ≤ -17%) [2]



Regional MyoStrain® Measurements

Longitudinal MyoStrain



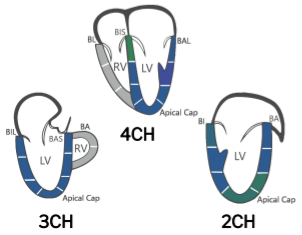
	Basal		Mid		Apical	
LV	Anterior	-11.5 %	Anterior	-12.8 %	Anterior	-14.5 %
	Anteroseptal	-10.8 %	Anteroseptal	-14.8 %	Septal	-8.1 %
	Inferoseptal	-22.4 %	Inferoseptal	-11.7 %	Inferior	-12 %
	Inferior	-23.6 %	Inferior	-17.5 %	Lateral	-14.3 %
	Inferolateral	-24.3 %	Inferolateral	-17 %		
	Anterolateral	-17.4 %	Anterolateral	-5.5 %		

[1]

-30% -17% -10% 0% +10%

RV	Anterior	--	Anterior	--
	Lateral	--	Lateral	--
	Inferior	--	Inferior	--

Circumferential MyoStrain



	3CH		4CH		2CH	
LV	Basal Inferolateral	-24.3 %	Basal Inferoseptum	-15.7 %	Basal Inferior	-17.6 %
	Mid Inferolateral	-23.7 %	Mid Inferoseptum	-22.3 %	Mid Inferior	-21.7 %
	Apical Lateral	-24.2 %	Apical Septum	-25.1 %	Apical Inferior	-21.3 %
	Apical Cap	-18.6 %	Apical Cap	-22.7 %	Apical Cap	-16.6 %
	Apical Anterior	-24.9 %	Apical Lateral	-25.5 %	Apical Anterior	-16.4 %
	Mid Anteroseptum	-25.5 %	Mid Anterolateral	-28.3 %	Mid Anterior	-21 %
	Basal Anteroseptum	-26.8 %	Basal Anterolateral	-26.3 %	Basal Anterior	-18.6 %

[1]

-30% -17% -10% 0% +10%

RV	Basal Anterior	--	Basal Lateral	--
	Mid Anterior	--	Mid Lateral	--
			Apical Lateral	--

Global MyoStrain® Measurements

Global MyoStrain®	Result	Normal [1]
MyoStrain (GLS) LV	-14.6 %	(<-17)
MyoStrain (GCS) LV	-21.7 %	(<-17)
MyoStrain (GLS) RV	--	(<-17)
MyoStrain (GCS) RV	--	(<-17)

Traditional Measurements	Result		Index	Normal [3]
LVEF	61.6	%	-	(53-74)
LV Mass	118.9	g	62.25	(39-75) g/m2
LVED Volume	129.8	ml	67.96	(53-99) ml/m2
LVES Volume	49.8	ml	26.07	(15-40) ml/m2
LV Stroke Volume	80	ml	41.88	(35-63) ml/m2

In Conlusion

+ **MyoStrain:** An accurate measurement of segmental strain of the myocardium
+ **SENC:** Strain-encoding, single-heartbeat acquisition, pulse sequence.
+ **MyoHealth:** A score number, based on MyoStrain, to measure the health of the myocardium
+ Acquiring 12 movies in 12 heartbeats, we quantify segmental strain with high accuracy
+ Combining 2D contours to create 4D model of the LV; producing all volumetric and morphological measurements
+ AI is used for segmenting strain movies and creating the 4D Model